

Eddy-Resolving Simulations of the Tropical Instability Waves and Vortices using the Parallel Regional Ocean Modeling System

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The recently developed Regional Ocean Modeling System (ROMS) with MPI capability has been implemented for the eastern equatorial Pacific Ocean to study the seasonal variability of the Tropical Instability Waves and Vortices. The model is driven at the surface by the real-time QuickScat wind and monthly mean heat and salt fluxes. This is the first time that a model of this type, previously used mostly for coastal and basin-scale simulations, has been implemented for the equatorial region with an eddy-resolving, 10 km horizontal resolution and a generalized topography-following vertical coordinate system. The model produces the seasonal variability of the equatorial cold tongue in SST and the three-dimensional structure of the upper ocean vortices in the tropical Pacific Ocean. Comparisons with the satellite measurements of SST by the TRMM Microwave Imager suggest the cusp-shaped disturbances of the cold tongue fronts are caused by trains of large-amplitude vortices, which are driven by instability of the mean zonal shear.